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EXAMINER	
BAND, MICHAEL A	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/820,896	NEWCOMB ET AL.	
	Examiner	Art Unit	
	MICHAEL BAND	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-12,16-19,21 and 23-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3, 5-12, 16-19, 21, and 23-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 16-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 16 and 19 contain the limitation requiring a liquid-metal electrical connector with bonded contacts. Applicant's Specification specifies mercury (a liquid at room temperature and above) as the liquid-metal connector. It is not possible for a liquid metal, such as mercury, to have a bonded contact.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3, 5, 9-10, 12, 21, 23, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wurczinger (WO 03080891), equivalent to Wurczinger (USPGPub 2005/0178662).

With respect to claims 1, 21, 23, and 25-27, Wurczinger discloses a system for coating a substrate (p. 1, para 2) where fig. 2 depicts a vacuum chamber [1], a rotatable tube positioned inside the vacuum chamber [1]-[2], a shaft connect to the rotatable tube (fig. 3, [2]-[3]); a closest bearing [16] positioned outside said vacuum chamber [1]; a seal [13] positioned between said closest bearing [16] and said vacuum chamber [1]; and a power coupler [22]-[23] configured to deliver power to rotatable tube, the power coupler, with a current limiter [23], positioned with said closest bearing [16] and said seal [13] (p. 1, para 0017-0019). However Wurczinger is limited in that it is not suggested to move the power coupler and current limiter [23] between the closest bearing [16] and vacuum chamber [1].

It has been held that the rearrangement of parts is unpatentable as an obvious matter of design choice. See MPEP 2144.04, Section VI. Therefore it would have been obvious to one ordinary skill to position the power coupling [23] between the closest bearing [16] and the vacuum chamber [1] to remove a mass (i.e. closest bearing) from the electrical path of the power couplings [22]-[23] and the cathode tube [2] that inherently provides some degree of electrical resistance in order to reduce the amount of electrical energy lost due to said resistance in addition to the different positioning of said closest bearing [16] not having an effect as to the functioning of the apparatus as a whole.

With respect to claim 3, Wurczinger further discloses the system comprising the rotatable tube and shaft are integrated (fig. 1, [2]-[3]).

With respect to claim 5, Wurczinger further discloses the system comprising a drive system (fig. 2, [18]) configured to rotate the shaft (fig. 2, [3]) (p. 1, para 0017).

With respect to claim 9, Wurczinger further discloses the system wherein the power coupler is positioned outside the vacuum chamber (fig. 2, [1], [9]).

With respect to claim 10, Wurczinger further discloses the system wherein the power coupler comprises a water-cooled slip (fig. 2, [9], [23]; fig. 3, [4]). Wurczinger further depicts fig. 3 having an inner body [25] of the target tube with cooling conduit inflow [4] and outflow [5] running through the inner body according to fig. 4.

With respect to claim 12, Wurczinger further discloses the system comprising a support positioned inside the vacuum chamber, wherein the rotatable tube is continually supported by the support (fig. 3, [1]-[2], [10], [39]; p. 2, para 0020). Wurczinger further depicts fig. 3 having an inner body [25] of the target tube with cooling conduit inflow [4] and outflow [5] running through the inner body according to fig. 4.

5. Claims 2, 6, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wurczinger (WO 03080891), equivalent to Wurczinger (USPGPub 2005/0178662), as applied to claims 1 and 23 above, and further in view of Barret (US Patent No. 6,736,948).

With respect to claims 2 and 24, the reference is cited as discussed for claims 1 and 23. However Wurczinger is limited in that while it does disclose transferring power into and out of the vacuum chamber and through the cathode [2] (p. 1, para 0018), it

does not state whether a power coupler is placed outside or inside the vacuum chamber.

Barrett teaches a cylindrical magnetron for sputter deposition with a drive system designed to operate with a high capacity electrical transfer system (abstract; col. 3, lines 52-57). Barrett further teaches transferring electrical power to and from a rotating target at the high levels required (col. 2, lines 14-16). In order to sputter effectively the targets must be in a vacuum environment as is well known in the art and exemplified in Barrett (col. 11, lines 32-34). Therefore the power coupler is inside the vacuum chamber. By transferring the electrical power within the device to rotating components, the undesirable effects of heat generation are better controlled and minimized at dynamic locations (col. 4, lines 6-9).

It would have been obvious to one of ordinary skill in the art to place the power coupler inside the vacuum chamber as taught in Barrett for the apparatus in Wurczinger in order to gain the advantages of increased control and minimization of negative heat generation characteristics and one of ordinary skill would have a reasonable expectation of success in making such a modification.

With respect to claim 6, Wurczinger is limited in that while it discloses using bearings on the shaft (fig. 2, [3], [16]-[17]; fig. 1, [3]), it does not describe the composition of the bearings.

Barrett further teaches a cylindrical magnetron for sputter deposition with a drive system designed to operate with a high capacity electrical transfer system (abstract; col. 3, lines 52-57). Barrett also teaches a bearing (part 334) being "a full ceramic bearing"

(col. 8, line 33) since "ceramic material has the advantage of being non-conductive, which means it will not heat up due to AC induction resulting from the current flow" (col. 8, lines 34-36).

It would have been obvious to one of ordinary skill in the art to compose the bearings of ceramic material taught in Barrett for the bearings in Wurczinger in order to gain the advantages of imperviousness to heat due to electrical conduction from current flow and one of ordinary skill would have a reasonable expectation of success in making such a modification.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wurczinger (WO 03080891), equivalent to Wurczinger (USPGPub 2005/0178662), as applied to claim 1 above, and further in view of Needham (US Patent No. 4,115,283).

With respect to claim 7, the reference is cited as discussed for claim 1. However Wurczinger is limited in that while it discusses using bearings on the shaft, it does not disclose the bearings being comprised specifically of ceramic needles.

Needham teaches bearings known for antifriction composition (i.e. will not heat due to electrical conduction) (abstract). In addition to being composed of a variety of metallic materials, the bearings comprise about 15 to 25 weight percent of ceramic fibers (i.e. needles) (col. 1, lines 56-64). Needham further states that these compositions are useful in a variety of applications such as journal bearings, bushings, ball bearing cages, and a variety of fittings, washers, seals, seats, wear rings, and the like (col. 4, lines 48-52). Ceramic material is also well known to be impartial to heating effects.

It would have been obvious to one of ordinary skill in the art to use ceramic fibers taught in Needham as part of the bearing composition in Wurczinger in order to gain the advantage of imperviousness to heat and friction.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wurczinger (WO 03080891), equivalent to Wurczinger (USPGPub 2005/0178662), as applied to claim 1 above, and further in view of Tanaka (UK Patent Application No. 2,290,305).

With respect to claim 8, the reference is cited as discussed for claim 1. However Wurczinger is limited in that while it discusses using bearings on a shaft for a cylindrical magnetron (abstract; fig. 2, [3], [16]-[17]; fig. 1, [3]), it does not disclose the type of composition for the metal or metallic material bearing.

Tanaka teaches a bearing alloy for use in oxidizing atmosphere, high-temperature applications (p. 1, lines 3-5). Tanaka further teaches the alloy to be composed of, by weight, about 9 to 30% chromium, 2 to 22% cobalt, 1.4 to 11% molybdenum, and nickel composing a significant portion of the remaining alloy matrix (p. 1, 18-20; Table 1; Table 2). Tanaka '305 further discusses that a feature of the invention is " a combination of a bearing and a shaft, in which the bearing is formed of the bearing alloy" (p. 5, lines 5-7). Tanaka discusses the advantages of using this alloy as excellent oxidation resistance and wear resistance while decreasing wear loss of the shaft for high-temperature applications (p. 5, lines 21-25).

It would have been obvious to one of ordinary skill in the art to use the bearing alloy taught in Tanaka for the bearings in Wurczinger in order to gain the advantages of

excellent oxidation resistance and wear resistance while decreasing wear loss of the shaft for high-temperature applications.

8. Claims 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wurczinger (WO 03080891), equivalent to Wurczinger (USPGPub 2005/0178662), as applied to claim 1, and further in view of Toki (Japanese Patent No. 01305523).

With respect to claim 11, the reference is cited as discussed for claim 1. However Wurczinger is limited in that while it discusses a power coupler used to transfer power into and out of the vacuum chamber (p. 1, para 0018), it does not tell whether the power coupler is comprised of a liquid-metal connector.

Toki teaches supplying a high frequency power to electrodes (i.e. target), by a structure wherein a bearing case, which supports an electrode (i.e. cathode/target) to be rotated (i.e. cylindrical magnetron) in a vacuum vessel (abstract). An electrically conductive liquid is used as a connection terminal between the electrode (i.e. cathode/target) for the high frequency power (abstract). Toki further teaches that mercury is used to electrically connect the electrode and the case, thus making the mercury a liquid-metal connector. The electrical heating caused from the electrical current flowing through the liquid-metal connector of power coupling will cause fusion on a molecular scale of the liquid-metal and walls in contact with said liquid-metal connector, thus forming a bond. The advantage to using a mercury connector is power can be supplied to the electrode without being affected by abrasion of the bearing mechanism (abstract).

It would have been obvious to one of ordinary skill in the art to use the mercury connector taught in Toki as the power coupler in Wurczinger in order to gain the advantage of decreased resistivity, and thus decrease in loss of power, between the bearing and the cathode and one of ordinary skill in the art would have a reasonable expectation of success in making such a modification.

9. Claims 16 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wurczinger (WO 03080891), equivalent to Wurczinger (USPGPub 2005/0178662), in view of Toki (Japanese Patent No. 01305523).

With respect to claims 16 and 18-19, Wurczinger discloses a system for coating a substrate (p. 1, para 2) where fig. 2 depicts a vacuum chamber [1], a rotatable tube positioned inside the vacuum chamber [1]-[2], a shaft connect to the rotatable tube (fig. 3, [2]-[3]); a closest bearing [16] positioned outside said vacuum chamber [1]; a seal [13] positioned between said closest bearing [16] and said vacuum chamber [1]; and a power coupler [22]-[23] configured to deliver power to rotatable tube, the power coupler, with a current limiter [23], positioned with said closest bearing [16] and said seal [13] (p. 1, para 0017-0019). However Wurczinger is limited in that it is not suggested to move the power coupler and current limiter [23] between the closest bearing [16] and vacuum chamber [1].

It has been held that the rearrangement of parts is unpatentable as an obvious matter of design choice. See MPEP 2144.04, Section VI. Therefore it would have been obvious to one ordinary skill to position the power coupling [23] between the closest bearing [16] and the vacuum chamber [1] to remove a mass (i.e. closest bearing) from

the electrical path of the power couplings [22]-[23] and the cathode tube [2] that inherently provides some degree of electrical resistance in order to reduce the amount of electrical energy lost due to said resistance in addition to the different positioning of said closest bearing [16] not having an effect as to the functioning of the apparatus as a whole.

However Wurczinger is further limited in that while it discusses a power coupler used to transfer power into and out of the vacuum chamber (p. 1, para 0018), it does not tell whether the power coupler is comprised of a liquid-metal connector.

Toki teaches supplying a high frequency power to electrodes (i.e. target), by a structure wherein a bearing case, which supports an electrode (i.e. cathode/target) to be rotated (i.e. cylindrical magnetron) in a vacuum vessel (abstract). An electrically conductive liquid is used as a connection terminal between the electrode (i.e. cathode/target) for the high frequency power (abstract). Toki further teaches that mercury is used to electrically connect the electrode and the case, thus making the mercury a liquid-metal connector. The electrical heating caused from the electrical current flowing through the liquid-metal connector of power coupling will cause fusion on a molecular scale of the liquid-metal and walls in contact with said liquid-metal connector, thus forming a bond. The advantage to using a mercury connector is power can be supplied to the electrode without being affected by abrasion of the bearing mechanism (abstract).

It would have been obvious to one of ordinary skill in the art to use the mercury connector taught in Toki as the power coupler in Wurczinger in order to gain the

advantage of decreased resistivity, and thus decrease in loss of power, between the bearing and the cathode and one of ordinary skill in the art would have a reasonable expectation of success in making such a modification.

10. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wurczinger (WO 03080891), equivalent to Wurczinger (USPGPub 2005/0178662), and Toki (Japanese Patent No. 01305523) as applied to claim 16 above, and further in view of Barret (US Patent No. 6,736,948).

With respect to claim 17, the references are cited as discussed for claim 16. However Wurczinger and Toki are limited in that while both discuss using a bearing to connect the shaft to the vacuum and to provide rotation (Wurczinger; fig. 2, [16]-[17]; p. 1, para 0018) (Toki; abstract), neither discusses the composition of the bearing.

Barrett further teaches a cylindrical magnetron for sputter deposition with a drive system designed to operate with a high capacity electrical transfer system (abstract; col. 3, lines 52-57). Barrett also teaches a bearing (part 334) being "a full ceramic bearing" (col. 8, line 33) since "ceramic material has the advantage of being non-conductive, which means it will not heat up due to AC induction resulting from the current flow" (col. 8, lines 34-36). Ceramic is well known to be an inorganic, non-metallic material.

It would have been obvious to one of ordinary skill in the art to compose the bearings of ceramic material taught in Barrett for the bearings in modified Wurczinger in order to gain the advantages of imperviousness to heat due to electrical conduction from current flow.

Response to Arguments

Drawing Objections

11. The Applicant has amended claim 19 to no longer claim a midpoint. Therefore the objection is withdrawn.

112 Rejections

12. The Applicant has amended claim 19 to no longer claim a midpoint. Therefore the rejection is withdrawn.

13. The Applicant has pointed to the figures to show support for a closest bearing. Therefore the rejection is withdrawn. The Examiner does note however that para 0042 does recite anything specific about a closest bearing, with para 0044 not present in Applicant's Specification.

14. Applicant's arguments with respect to claims 1-3, 5-12, 16-19, and 21 have been considered but are moot in view of the new ground(s) of rejection due to the new claim limitations requiring the power coupler between the closest bearing and the vacuum chamber and a liquid-metal electrical connector with bonded contacts.

103 Rejections

15. On p. 9-12, the Applicant argues that Wurczinger does not teach a power coupler between a bearing and a vacuum tube.

While the Examiner agrees that Wurczinger does not explicitly teach a power coupler between a bearing and a vacuum tube, it has been held that a rearrangement of parts qualifies as an obvious matter of design choice since the functioning of the sputtering cathode is the same. The following is reasoning from the rejections above: "It has been held that the rearrangement of parts is unpatentable as an obvious matter of design choice. See MPEP 2144.04, Section VI. Therefore it would have been obvious to one ordinary skill to position the power coupling [23] between the closest bearing [16] and the vacuum chamber [1] to remove a mass (i.e. closest bearing) from the electrical path of the power couplings [22]-[23] and the cathode tube [2] that inherently provides some degree of electrical resistance in order to reduce the amount of electrical energy lost due to said resistance in addition to the different positioning of said closest bearing [16] not having an effect as to the functioning of the apparatus as a whole".

16. On p. 12, the Applicant argues that the composition of the claimed cobalt in Mp35N is different from the alloy of Tanaka.

While the Examiner agrees that the two compositions differ, the compositions contain similar elements. The alloy Mp35N contains Ni (33-37%)-Co (the balance)-Cr (19-21%)-Mo (9-11) with Si (0.15%) (see PTO-892, Ref U, dated 4/30/2007), with the alloy of Tanaka being Co (2-22%)-Mo (1.4-11%)-Cr (9-30%)-Si (0.1-1.5%) with the balance being Ni (p. 1, lines 18-21). Since the both alloys contain similar elements in slightly different compositions, one of ordinary skill in the art would expect the same properties present in the alloy Tanaka to be the same for the claimed Mp35N alloy.

17. On p. 12-13, the Applicant argues that it would not be obvious to one of ordinary skill in the art to modify Wurczinger with Barret since Barrett discloses moving the entire apparatus inside the vacuum chamber.

The Examiner respectfully disagrees. Wurczinger would undergo the simple modification of moving a power coupler, such as is seen in fig. 2, [22] to the inside of the vacuum chamber [1] instead of outside said vacuum chamber [1]. One of ordinary skill would be motivated to make this change to gain the advantages of increased control of the process and minimization of negative heat generation. Barrett does not need to undergo any modifications.

18. On p. 13, the Applicant argues that while the reference Needham discloses ceramic fibers, this is different from the claimed ceramic needles.

The Examiner respectfully disagrees. A ceramic fiber is an elongated strand of a ceramic material, with a ceramic needle also being an elongated strand of a ceramic material.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent Nos. 5,200,049; 6,841,051.

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Band whose telephone number is (571) 272-9815. The examiner can normally be reached on Mon-Fri, 8am-4pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

22. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./

Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795